

CLAIMS

1. A mobile electronic computer unit (1) adapted to be held in one hand, particularly of the type of a so-called personal data assistant (PDA) or handheld computer, comprising a software-controlled processor unit (3); at least one storage device (4) connected to said processor unit for storing software modules and/or data to be processed; at least one display device (8) for the visually detectable output of information; and at least one input device (10) for at least influencing the operational functions of the computer unit (1) and/or for inputting data, whereby the display and input device (8, 10) preferably of the type of a screen sensitive to touch, for example in the form of a touch screen (12), are structurally superposing one another or are functionally combined; and with at least one interface (6; 7) of the standard type formed on the housing (2) of the computer unit (1), said interface being adapted to communicate with peripheral electronic or electric devices such as, for example a personal computer, wherein said standard-type interface (6; 7) and an independently designed interface are provided for being connected with at least one safety switch element (13) of the type of an emergency OFF-switch (14) and/or an approval key (15).
(FIGS 2 to 7).

2. The mobile computer unit according to claim 1, wherein technical software means processible in the storage device (4) by the processor unit (3), are stored for detecting and evaluating the given actual actuation or switching state of at least one safety switch element (3).

3. The mobile computer unit according to claim 1 or 2, wherein technical software means processible in the storage device (4) by the processor unit (3), are stored for transmitting or supplying to an external electronic machine control (52) via the standard-type interface (6; 7) information about the active or inactive actuation or switching state of at least one safety switch element (13).

4. The mobile computer unit according to one or more of the preceding claims, wherein technical software means are stored in the storage device (4) for functionally and data-technologically connecting the processor unit (3) and/or the input device (10) and/or

the display device (8) to a standard-type communication interface (56) of an external industrial machine control (52).

5. The mobile computer unit according to one or more of the preceding claims, wherein technical software means are stored in the storage device (4) for utilizing the computing capacity of an externally connected, per-se independently functioning machine control (52) in conjunction with the processor unit (3).

6. The mobile computer unit according to one or more of the preceding claims, wherein technical software means are stored in the storage device (4) for utilizing the display capabilities of the display device (8) in combination with an external industrial machine control (52).

7. The mobile computer unit according to one or more of the preceding claims, wherein technical software means are stored in the storage device (4) for utilizing the input capabilities of the input device (10) in conjunction with an external industrial machine control (52).

8. The mobile computer unit according to one or more of the preceding claims, wherein technical software means are stored in the storage device (4) for forming a converter for converting or adapting a communication log provided on the interface (6; 7) as a standard feature, into/to a communication log valid on the communication interface (56) of an industrial machine control (52) to be connected, and/or vice-versa.

9. The mobile computer unit according to one or more of the preceding claims, wherein technical software means are stored in the storage device (4) for utilizing the computer unit (1) as an operating and/or display device (75) connectable to the external machine control (52), or to a machine or plant controlled therewith as required.

10. The mobile computer unit according to one or more of the preceding claims, wherein technical software means are stored in the storage device (4) for utilizing the computer unit (1) as a programming device (76) temporarily connectable to the external

machine control (52) for functions or operational sequences of the machine control (52) or a machine or plant controlled therewith.

11. The mobile computer unit according to one or more of the preceding claims, wherein technical software means and/or technical hardware means are stored in the storage device (4) for transmitting and/or receiving data or signals with heightened functional safety and reliability versus an external industrial machine control (52).

12. The mobile computer unit according to one or more of the preceding claims, wherein personal data and/or person-related adjustments, in particular user profiles are stored in the storage device (4) and, if need be, selectable therefrom, such data and adjustments and user profiles defining the properties or pre-settings of the computer unit (1) itself and/or of an industrial machine control (52) connectable to said storage device.

13. Application of a commercially available electronic computer unit (1) adapted to be held in one hand for operating and/or monitoring and/or programming operational sequences or conditions of per-se independently functioning industrial machine controls (52) and/or a machine or plant controlled therewith.

14. The application of a commercially available electronic computer unit (1) adapted to be held in one hand according to one or more of claims 1 to 12, for maintaining and/or diagnosing technical operational sequences or conditions of per-se independently functioning industrial machine controls (52) and/or of a machine or plant controlled therewith.

15. An expansion device (32) adapted for coupling it as required with a commercially available electronic computer unit (1) portable in one hand, comprising a frame- and housing-like support body (33) and a receiving means (34) on said support body, for loosely allocating the latter to or mechanically connecting it with a computer unit (1), as well as an interface (35) for producing a signal or data transmission link with said computer unit (1), whereby said interface (35) available on the side of said support body is provided for connection to an interface (6; 7) available on the computer unit (1) as a standard feature, wherein at least one safety switch element (13) of the type of an emergency

OFF switch (14) and/or an approval key (15) are formed on the support body (33) for the secured execution, initiation, termination or monitoring of functions or operational sequences of industrial machine controls (52) and/or of a machine or plant controlled therewith, such functions or sequences being critical to safety. (FIGS. 2 to 7)

16. The expansion device according to claim 15, wherein outputs or connections of the manually activated safety switch element (13) are directly and/or indirectly connected via an electronic converter (38) to the interface (35) linking said safety element with the computer unit (1), the latter being adapted to be accommodated or allocated as required, and/or to an interface (39) leading to an external industrial machine control (52).

17. The expansion device according to claim 15, wherein one single interface (35; 39) is formed on the support body (33) for actively linking an allocated computer unit (1) and the safety switch element (13) with an external electronic machine control (52).

18. The expansion device according to claim 15, wherein the interface (35) leading to an allocable mobile computer unit (1), and an interface (39) leading to an external machine control (52) to be linked with said computer unit, are technologically identical.

19. The expansion device according to claim 15, wherein an interface (6) between the safety switch element (13) and a mobile computer unit (1) adapted to be allocable thereto as required, is formed by a wireless interface, in particular an infrared interface (85) and a radio signal interface.

20. The expansion device according to one or more of claims 15 to 19, wherein the size of the receiving means (34) on the support body (33) approximately conforms to the size of the housing (2) of a computer unit (1) to be coupled therewith.

21. The expansion device according to claim 15 or 20, wherein in the receiving means (34) or within the area around said receiving means (34), provision is made for at least one holding means (45, 46), particularly for at least one coupling means (47, 48) for producing a mechanically secured and releasable, if need be, connection between the support body

(33) and a computer unit (1) intended to be assigned thereto.

22. The expansion device according to one or more of claims 15 to 21, wherein the interface (35; 39) on the support body (33) is placed in a manner such that inserting or allocating a computer unit (1) intended for such insertion or allocation will automatically functionally set up a data or signal transmission link with the safety switch element (13) and/or an external industrial machine control (52).

23. The expansion device according to one or more of claims 15 to 22, wherein an electronic controller and/or evaluator (53) or at least one electronic converter (38) is formed for functionally linking an allocated computer unit (1) with an external industrial machine control (52).

24. The expansion device according to claim 23, wherein technical software means for adapting or interfacing communication logs of the allocated computer unit (1) and/or communication logs of the external industrial machine control (52), are stored in the controller and/or evaluator (53).

25. The expansion device according to one or more of claims 15 to 24, wherein a controller and/or evaluator (53) are integrated in or secured on the support body (33), and that technical software means are stored in a storage device (59) of the controller and/or evaluator (53) for detecting and evaluating the given actual switching or actuation state of the safety switch element (13), and for transmitting or supplying information pertaining to the active or inactive switching or actuation status at least of the safety switch element (13), to an external electronic machine control (52).

26. The expansion device according to one or more of claims 23 to 25, wherein the controller and/or evaluator (53) has technical software and/or hardware means for transmitting and/or receiving data or signals with heightened functional safety or reliability vis-à-vis an external industrial machine control (52).

27. The expansion device according to one or more of claims 23 to 26, wherein the

controller and/or evaluator (53) is designed for transmitting personal data or person-related identifications to an external industrial machine control (52).

28. The expansion device according to one or more of claims 23 to 27, wherein individual adjustments or user profiles for an allocated computer unit (1) and/or a connectable external machine control (52) can be storable in, retrievable from and/or changeable in the control and/or evaluator (53).

29. The expansion device according to one or more of claims 15 to 28, wherein at least one input element (79) such as, e.g. a key (80), a switch, a proportional control element, a potentiometer or the like are formed on the support body (33).

30. The expansion device according to one or more of claims 15 to 29, wherein at least one movement control element such as, e.g. a joystick (82) or a track ball or the like is formed on the support body (33).

31. The expansion device according to one or more of claims 15 to 30, wherein the support body (33) is realized in the form of a softly elastic or shock-absorbing cover for a mobile computer unit (1) mechanically connectable therewith.

32. The expansion device according to one or more of claims 15 to 31, wherein the support body (33) at least partly encloses the edge and corner zones of a housing (2) of a computer unit (1) allocated to and inserted in the receiving means (34) of said support body accommodating said housing.

33. The expansion device according to one or more of claims 15 to 32, wherein an energy supply device (91) formed by electrochemical voltage sources (92) is formed independently of an energy supply mains network.

34. The expansion device according to claim 33, wherein the energy supply device (91) is formed by batteries replaceably receivable in the support body (33).

35. The expansion device according to one or more of claims 15 to 34, wherein the interface (39) leading to an external industrial machine control (52) is formed by a wireless communication interface, for example an infrared or radio signal interface (88). (FIG. 7).

36. The expansion device according to claim 35, wherein the wireless communication interface is formed by a wireless LAN, Bluetooth, GSM or UMTS interface.

37. The expansion device according to claim 35 or 36, wherein the interface (39) is formed by a wireless interface designed as a standard type interface on a mobile computer unit (1) to be allocated or received.

38. The expansion device according to one or more of claims 15 to 34, wherein the interface (39) is formed by a cable-bound interface, for example by a USB or an IEEE 1394 interface.

39. A mobile electronic computer unit (1) adapted to be held in one hand, particularly of the type of a so-called personal data assistant (PDA) or handheld computer, comprising at least one software-controlled processor unit (3); at least one storage device (4) connected to said processor unit for storing software modules and/or data to be processed by said processor unit; at least one display device (8) for the visually detectable output of information; and at least one input device (10) for at least influencing the operations functions of the computer unit (1) and/or for inputting data, whereby the display and input devices (8; 10) are at least in part realized in the form of a screen sensitive to touch, for example in the form of a touch screen (12); and, furthermore, with at least one interface (6; 7) formed on the computer unit (1) as a standard feature, said interface being provided for connecting peripheral electronic or electric device such as, for example a personal computer, wherein a safety switch element (13) of the type of an emergency OFF switch (14) or a quick-stop key or a reliably functioning tripping key and/or an approval key (15). (FIG 1)

40. The mobile computer unit according to claim 39, wherein the safety switch element (13) is connected to an input (20, 21) of the processor unit (3) via at least one line (18, 19).

41. The mobile computer unit according to claim 39 or 40, wherein the safety switch element (13) is connected to one of the standard-type interfaces (6; 7), or to an interface on the housing (2) of the mobile computer unit (1) specially provided for safety purposes.

42. The mobile computer unit according to any one of claims 39 to 41, wherein the safety switch element (13) is arranged in one of the edge zones (23 to 26) of the plate- or panel-like housing (2).

43. The mobile computer unit according to any one of claims 39 to 42, wherein the direction of actuation (27) of the safety switch element (13) is aligned parallel to the upper or lower flat side of the housing (2).

44. The mobile computer unit according to any one of claims 39 to 43, wherein the emergency OFF switch (14) is arranged in the edge zone (23) of the housing (2) disposed at the top or in front when the housing is in use.

45. The mobile computer unit according to any one of claims 39 to 44, wherein an actuation element (22) of the emergency OFF switch (14) protrudes in the form of a mushroom versus the surface of the housing (2).

46. The mobile computer unit according to any one of claims 39 to 45, wherein an approval key (15) for executing functions critical to safety is formed in each of the marginal or edge zones (24, 26) on the longitudinal sides of the housing (2).

47. The mobile computer unit according to any one of claims 39 to 46, wherein the approval keys (15) are accommodated in breakthroughs (28, 29) of the housing (2), said breakthroughs being covered by an elastically yielding, for example rubber-like membrane (30, 31) for delimiting the interior of the housing (2) versus the environment of the mobile computer (1) in an at least dust-proof manner.

48. The mobile computer unit according to any one of claims 39 to 47, wherein the elastically yielding membrane (30, 31) is formed in the longitudinal edge zones of the

housing (2), or within reach of the finger tips of the hand of a user holding the mobile computer unit (1).

49. The mobile computer unit according to any one of claims 39 to 48, wherein the safety switch element (13) is a multi-stage element comprising both an approval and an emergency OFF function.

50. The mobile computer unit according to claim 49, wherein the safety switch element (13) comprises a no-actuation idle position, an approval position and an emergency OFF or panic position.

51. The mobile computer unit according to claim 50, wherein in the emergency OFF or panic position, an actuation element (16) of an approval key (15) is fixed or defined by exceeding a limit value of the force acting on such actuation element.

52. A manual terminal (77) for monitoring and/or operating and/or programming technical process routines or conditions, comprising at least one software-controlled processor unit (3); at least one storage device (4) linked with said processor unit for storing software modules and/or data to be processed; at least one display device (8) for displaying visually detectable information; and at least one input device (10) for at least influencing the operational functions of the manual terminal (77) and/or for inputting data, whereby the display device and the input device (8; 10) preferably realized in the form of a display screen sensitive to touch, for example of a touch screen (12), structurally superimpose each other or are functionally combined, and comprise at least one interface (6; 7; 39) for linking said devices to a communication interface (56) of the external machine control (52), wherein the display and/or input capabilities of the manual terminal (77) are realized by the touch screen (12) of a standard-type mobile computer unit (1) particularly of the type of a personal data assistant (PDA) or handheld computer. (FIGS. 1 to 7)

53. The handheld terminal according to claim 52, wherein at least one manually activated safety switch element (13) of the type of an emergency OFF switch (14) or a quick-stop key or a reliably functioning tripping key and/or an approval key (15) is provided on

the housing (78) or support body (33) of said terminal for executing, initiating, terminating or monitoring in a secured manner functions or routines of industrial machine controls (52) and/or of a machine or plant controlled with such a terminal, such functions or routines being critical to safety.

54. The manual terminal according to claim 52 or 53, wherein interfaces (6; 7) of a mobile computer unit (1) available on the latter as standard features, are utilized for linking the manual terminal (77) with an external industrial machine control (52) as required.

55. The manual terminal according to any one of claims 52 to 54, wherein a standard-type wireless interface (6) of a mobile computer unit (1) is utilized for producing a wireless link with an external industrial machine control (52) within a locally defined data transmission path (89, 90).

56. The manual terminal according to any one of claims 52 to 55, wherein at least one transmitting and/or receiving aerial (95, 96) is provided in the housing (78) or on the support body (33) of the manual terminal (77) for enhancing or raising the transmitting and/or receiving power of an allocated standard-type computer unit (1).

57. A supplemental device (62) for an industrial machine control (52) comprising at least a first communication interface (63) for linking it in terms of signal or data transmission technology to a corresponding communication interface (56) of the machine control (52), and at least one additional communication interface (64; 65; 66) for producing a signal or data transmission link to a mobile computer unit (1) as required, as defined in one or more of claims 1 to 12; or to an expansion device (32) as defined in one or more of claims 15 to 38; or to a mobile computer unit (1) as defined in one or more of claims 39 to 51; or to a manual terminal (77) as defined in one or more of claims 52 to 56. (FIG. 5)

58. The supplemental device according to claim 57, wherein the first communication interface (63) is formed by a cable-bound and contact-equipped interface, for example by an Interbus-, Profibus-, CAN-, DeviceNet-, Ethernet-, RS232-, USB-, Firewire- or other standard interface leading to a corresponding standard-type communication interface (56)

available on an industrial machine control (52).

59. The supplemental device according to claim 57 or 58, wherein the additional communication interface (64) is formed by a radio interface (67), for example according to the Bluetooth or Wireless-LAN or GSM or UMTS standards, or according to some other standard-type transmission system for radio signals, such radio signal interface (67) communicating with a radio signal interface (88) provided on a mobile standard-type computer unit (1).

60. The supplemental device according to one or more of claims 57 to 59, wherein said supplemental device can be structurally combined with an industrial machine control (52) in the way of an expansion module such as, for example an IO-module or plug in card.

61. A wireless communication system (61) for monitoring and/or operating and/or programming the routines or functions of industrial machine controls (52), wherein said communication system is comprised of a mobile computer unit (1) as defined in one or more of claims 1 to 12; an expansion device (32) as defined in one or more of claims 15 to 38; a mobile computer unit (1) as defined in one or more of claims 39 to 51; a manual terminal (77) as defined in one or more of claims 52 to 56; and a supplemental device (62) as defined in one or more of claims 57 to 60. (FIGS. 5; 7)